



18 June 1959

Dear Doc,

We have done some preliminary thinking about the experiment you plan to conduct. Since the details of your plans and the limitations imposed are unknown, the thoughts we have may be of no value. However, if you feel that we can help you by expanding any of the following comments, we will be glad to do so.

It seems to us that it is most important to recognize the degree of sensitivity of the experiment you plan to perform relative to the degree of sensitivity of the equipment which is required for the program now being contemplated. A 24-inch f/8 system has about one-third the sensitivity of the equipment presently contemplated. In addition, although our understanding is limited, it appears that the boundary layer effects in the experiment you plan to perform will be less than those to be expected in the contemplated program. Consequently, good results in the experiment will not necessarily assure good results in the contemplated program. On the other hand, poor results, unless they are due to conditions unique to the experiment (e.g. out-of-focus, improper image motion compensation, poor stabilization, engine or camera vibration, uncontrolled development, etcetera) would suggest that the contemplated program faces a serious limitation.

In view of the possibility that good results (qualitatively) can be obtained which would not necessarily assure the absence of limitation to the contemplated program (because of the experiment's sensitivity), it is crucial that tight experimental controls be exercised so that quantitative data can be obtained. The most important aspect in this regard is sensitometric control of the film and careful processing procedures.

In regard to specific experiments, there are two which appear to us to be of substantial value.

The first approach involves night operation and may be impossible for operational reasons. What we envision is this: The vehicle would pass over high intensity flash sources with the flight path perpendicular to the base line of the lights. (The shutter would remain open and film would not transport; and stabilization and IMC would not be required.) The lights would be separated sufficiently so that the spread of the flash sources' images in the focal plane are well separated. Furthermore some of the light sources would be attenuated by known gray filters to give variable intensity of illumination. If the sources flashed about once a second, then a string of dots would appear on the focal plane; and, by having a tilted platen (with the tilt in the direction of the flight), this would assure a variety of both in-focus and out-of-focus images. A comparison of these results with results obtained in a laboratory in the absence of a turbulent boundary layer would allow calculation of the image spread due to the boundary layer. (Probably it will be necessary to use the photographic

Page 2
17 June 1959

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window in the laboratory, also.)

The alternative experiment which we think might be valuable requires more work but does not require night operation. It will not yield the quantitative information which will be most useful in determining the effect of the vehicle's boundary layer, but it would give useful information. The suggestion is normal daytime operation over a specially prepared and carefully calibrated array of targets; and then analyze the images of these results from the point of view of sine wave response. For this to be valuable we believe that the lens has to be measured with the photographic window for sine wave response and that very accurate knowledge of the image motion compensation and vibration are also required. The second approach is not as valuable as the first, but is still useful.

We hope these preliminary thoughts are of some value to you, but we do realize that they may be impractical since we do not know essential details of the experimental equipment. We plan no further work in this regard unless you request it.

Best regards

Milt

Milt

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